A LOW MAINTENANCE, LOW WATER USE TOILET FLUSHING SYSTEM

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The development of an appropriate toilet for remote communities has taken many stages. The last feedback on the RADG toilet has been requests for a flushing toilet using a low water volume.

INTRODUCTION

There is little doubt that the common dry pit toilet is the best option for remote communities if the only criteria are low cost, low maintenance and low water use. The ventilation improved pit toilet (VIP) or its derivatives offer privacy, while limiting odours and flies. They are, however dark and lacking a little in comfort. The pour flush toilet, because it incorporates a water seal, allows the toilet to be bright and airy while still eliminating odours and flies. They are also extremely difficult to block. While not strictly a dry pit, flushing only requires two litres so the life of the pit is not unduly affected. While the pour flush system has been used successfully overseas, and would probably be welcomed in parks or camps, it has become clear that permanent communities prefer the convenience and amenity of a push-button cistern.

These are however, designed for the vast majority of Australians who live in the large cities and not for remote communities. They require frequent parts replacement, are easily damaged and can be inappropriately adjusted. At best they use a 5 or 10 litre flush. At worst they run continuously, flooding the pit or leach drains. Not only does this excessive water use render the toilet flushing inefficient, it also has to be paid for by the community.

The Remote Area Developments Group (RADG) were asked to develop an appropriate flushing system that could be used in conjunction with the current pour-flush bowl and which would deliver the same 2 litres per flush.

PROTOTYPE DEVELOPMENT

If the new cistern was to be completely maintenance free, it was apparent that the ball-cock had to be eliminated. This was achieved by completely sealing the cistern. The cistern then became an accumulator (see Figure). The mains water enters the cistern after flushing and compresses the the layer of air above it. The inflow of water ceases when the air is compressed to mains pressure thereby balancing the pressure of the mains supply. A non-return valve prevents backflow to the mains if mains pressure should drop for some reason.

The by-product of this simplified arrangement is that at flushing, the air is free to expand again and so the flush is delivered at mains pressure through the 32mm pipe connection to the pan. The force at which it delivers more than compensates for the small volume. It is ideally suited to the pour-flush

pan as the force can be delivered straight down into the water trap.

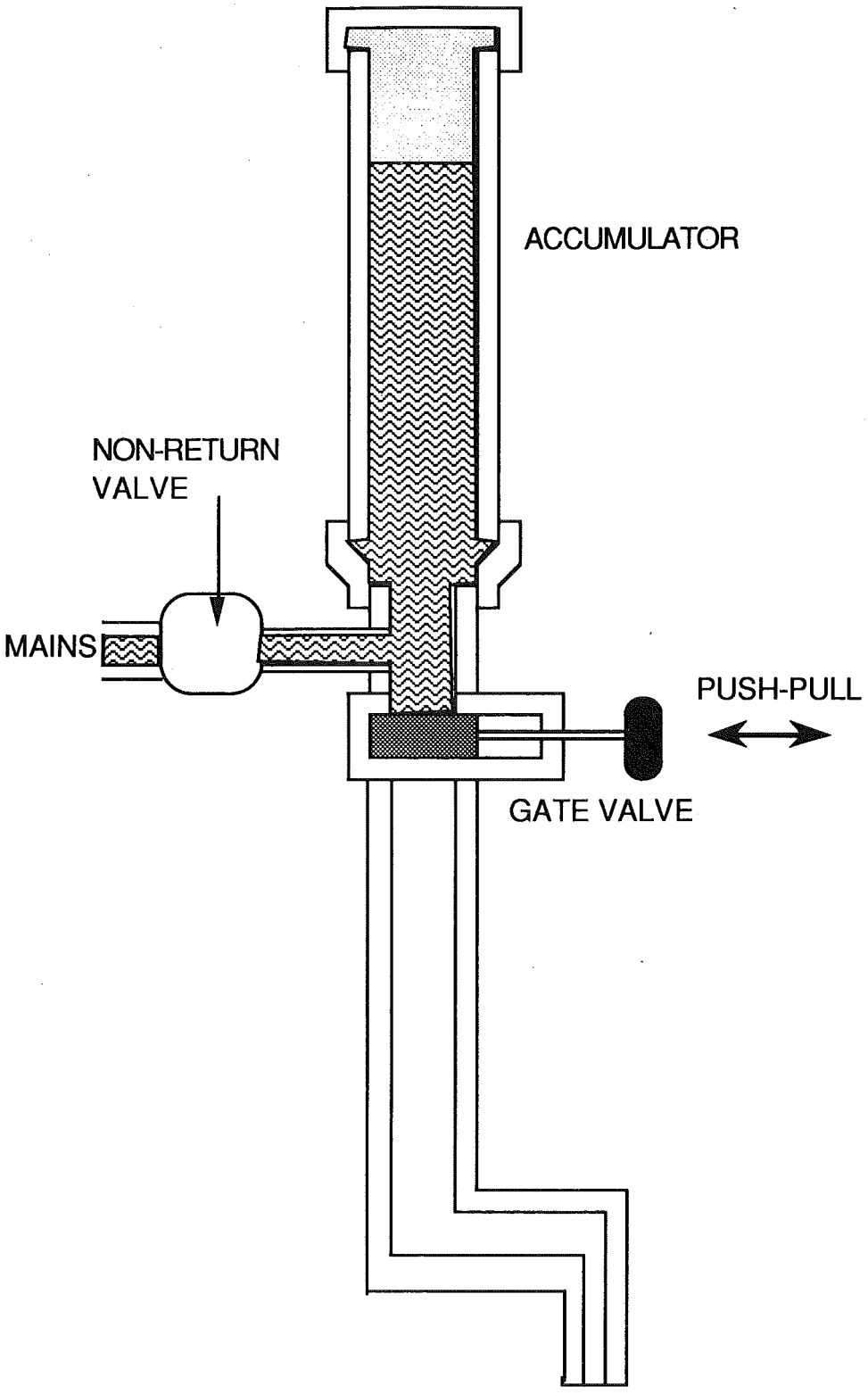
The only moving part of the whole system is the main flushing valve. Unlike the standard push-button cistern which only has to open against atmospheric pressure, the new valve has to open against 3, 4 or even 5 atmospheres pressure. Options tried for this have included a lever operated ball valve, which is difficult to make self-closing, and a push-pull gate valve which only requires the insertion of a spring to make it self-closing. If the numbers produced were sufficient, a manufacturer could easily adapt his mould so that it flushed on pushing in instead of pulling out, so it would be more difficult to damage. The longer term option would be a ceramic gate valve, so that only a light spring would be required to close the valve and the unit itself would last a lifetime.

The whole unit is assembled from class 9 UPVC pipe which can be glued together by semi-skilled workers and so suits decentralised production. A computer program is available to assess the size requirement for particular mains pressures and flushing requirements and will also be available in table form if required. Consultation with RADG is, of course always available for each new project.

The new cistern is adaptable to installation behind or in walls, having only the button visible if desired. As the accumulator can be installed anywhere not too far from the pan, it can be tailored to any installation requirement, even on the roof if only the pipe is desired inside the toilet.

SUMMARY

The new power-flusher is a low cost, low water use cistern with only one moving part that can be tailored to suit any architectural arrangement, even completely concealed within the wall. It can be made in any size without significantly altering the cost as no retooling is required. It can be made by semi-skilled workers from UPVC pipe which is extremely corrosion resistant.and long lasting. It can be made for under $50 and should meet WAWA requirements.



Cross-sectional view of the RADG Power Flusher showing the unit full of water and the layer of compressed air trapped above.